

PATENT COOPERATION TREATY

From the
INTERNATIONAL PRELIMINARY EXAMINING AUTHORITY

To: STEVEN P. FALLON
GREER, BURN & CRAIN, LTD
300 SOUTH WACKER DRIVE, SUITE 2500
CHICAGO, ILLINOIS 60606

PCT
RECEIVED
APR 03 2003
GROUP 1700
WRITTEN OPINION
(PCT Rule 66)

Date of Mailing
(day/month/year)

10 FEB 2003

Applicant's or agent's file reference
120165872PCT

REPLY DUE

within **ONE** months
from the above date of mailing

International application No.
PCT/US01/43330

International filing date (day/month/year)
20 NOVEMBER 2001

Priority date (day/month/year)
27 NOVEMBER 2000

International Patent Classification (IPC) or both national classification and IPC
IPC(7): H01L 21/3063 and US Cl.: 438/18, 459, 479, 486, 745, 750, 753

Applicant
THE BOARD OF TRUSTEES OF THE UNIVERSITY OF ILLINOIS

1. This written opinion is the first (first, etc.) drawn by this International Preliminary Examining Authority.

2. This opinion contains indications relating to the following items:

- I ☒ Basis of the opinion
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step or industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☒ Certain defects in the international application
- VIII ☐ Certain observations on the international application

3. The applicant is hereby invited to reply to this opinion.

When? See the time limit indicated above. ~~The applicant may, before the expiration of that time limit, request this Authority to grant an extension, see Rule 66.2(d).~~

How? By submitting a written reply, accompanied, where appropriate, by amendments, according to Rule 66.3. For the form and the language of the amendments, see Rules 66.8 and 66.9.

Also For an additional opportunity to submit amendments, see Rule 66.4.
For the examiner's obligation to consider amendments and/or arguments, see Rule 66.4 *bis*.
For an informal communication with the examiner, see Rule 66.6.

If no reply is filed, the international preliminary examination report will be established on the basis of this opinion.

4. The final date by which the international preliminary examination report must be established according to Rule 69.2 is: 27 MARCH 2003

Name and mailing address of the IPEA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

BENJAMIN UTECH

Telephone No. (703) 305-6302

WRITTEN OPINION

International application No.

PCT/US01/43330

I. Basis of the opinion

1. With regard to the elements of the international application:*

- ☒ the international application as originally filed
- ☒ the description:
 pages 1-11 , as originally filed
 pages NONE , filed with the demand
 pages NONE , filed with the letter of _____

- ☒ the claims:
 pages 12-14 , as originally filed
 pages NONE , as amended (together with any statement) under Article 19
 pages NONE , filed with the demand
 pages NONE , filed with the letter of _____

- ☒ the drawings:
 pages NONE , as originally filed
 pages NONE , filed with the demand
 pages NONE , filed with the letter of _____

- ☒ the sequence listing part of the description:
 pages NONE , as originally filed
 pages NONE , filed with the demand
 pages NONE , filed with the letter of _____

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.
 These elements were available or furnished to this Authority in the following language _____ which is:

- ☐ the language of a translation furnished for the purposes of international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of the translation furnished for the purposes of international preliminary examination (under Rules 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the written opinion was drawn on the basis of the sequence listing:

- ☐ contained in the international application in printed form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. ☒ The amendments have resulted in the cancellation of:

- ☒ the description, pages NONE
- ☒ the claims, Nos. NONE
- ☒ the drawings, sheets/fig NONE

5. ☐ This opinion has been drawn as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

* Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this opinion as "originally filed".

WRITTEN OPINION

International application No.

PCT/US01/43330

V. Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. statement

Novelty (N)	Claims <u>1-23</u>	YES
	Claims <u>NONE</u>	NO
Inventive Step (IS)	Claims <u>NONE</u>	YES
	Claims <u>1-23</u>	NO
Industrial Applicability (IA)	Claims <u>1-23</u>	YES
	Claims <u>NONE</u>	NO

2. citations and explanations

Claims 1-7, 10, 12-18, 20-21, 23 lack inventive step under PCT Article 33(3) as being obvious over Russell et al (US 6,093,941) in view of Yoshikawa et al (US 5,990,605)

Russell discloses a method for making LED comprises the steps of: forming/depositing a electrode layer of metal on a silicon (Group III-V material) surface (col 8, lines 21-22), etching the silicon substrate in a HF and nitric acid/oxidant for 2 minutes (col 5, lines 40-44), the etching step requires no electrical current/bias (col 5, lines 24-26)

Russell does not disclose depositing a thin (less than 10 nm) discontinuous layer of metal (Pt, Au, Pd) on a Si surface although Russell discloses forming a layer of metal. However, Yoshikawa discloses a method for forming LED comprises the step of forming a thin (2-20nm) discontinuous metal (Au, Pt, Pd) electrode 15 layer on a Si surface 13. It would not have involved an inventive step to have modified Russell's process by forming a thin discontinuous metal layer on the Si surface because Yoshikawa teaches that when considering the stability as an electrode/light emission device a thin (2-20nm) is the most suitable for the Au or Pt thin film electrode (col 7, lines 53-55. Regarding claims 3, 13, Russell discloses immersing the substrate in the etching solution and illuminating using laser (col 6, lines 3-5)

Claims 11, 22 lack an inventive step under PCT Article 33(3) as being obvious over Russell et al (US 6,093,941) in view of Lo (US 5,981,400). Russell has been described above. Russell does not disclose using GaN. However, Lo teaches using Si and GaN as material for substrate (col 12, lines 38-40). It would not have involved an inventive step to have modified Russell by using GaN as substrate because Lo teaches that transistor made of GaN can deliver high power (col 12, lines 40-41)

Claims 8, 19 lack an inventive step under PCT Article 33(3) as being obvious over Russell et al (US 6,093,941) in view of Yoshikawa et al (US 5,990,605) and further in view of Yamagata et al (US 5,695,557). Russell and Yoshikawa has been described above. Russell and Yoshikawa do not disclose using HF and hydrogen peroxide. However, Yamagata teaches that HF solution used in etching porous silicon layer comprises of a mixture of HF and hydrogen peroxide and the porous silicon can also be etched (Continued on Supplemental Sheet.)

WRITTEN OPINION

International application No.

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VII. Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

Claims 7, 18 are objected to under PCT rule 66.2(a)(v) as lacking clarity under PCT Articles 6 because the claims are indefinite for the following reason: Claims 7, 18 are indefinite for use of improper Markush language of "selected from the group of".

WRITTEN OPINION

International application No.

PCT/US01/43330

Supplemental Box

(To be used when the space in any of the preceding boxes is not sufficient)

Continuation of: Boxes I - VIII

Sheet 10

TIME LIMIT:

The time limit set for response to a Written Opinion may not be extended. 37 CFR 1.484(d). Any response received after the expiration of the time limit set in the Written Opinion will not be considered in preparing the International Preliminary Examination Report.

V. 2. REASONED STATEMENTS - CITATIONS AND EXPLANATIONS (Continued):

using a solution of HF and nitric acid (col 10, lines 61-64). It would not have involved an inventive step to have modified Russell and Yoshikawa by etching using HF and hydrogen peroxide in view of Yamagata teaching because both etching solution have the same function of etching porous silico, thus the substitution of one for the other would have produced an expected result.

Claims 1-23 meet the criteria set out in PCT Articles 33(4) because the claimed method can be used to clean semiconductor structures.

----- NEW CITATIONS -----

✓ US 6,093,941 A (RUSSELL et al) 25 JULY 2000, see column 5, lines 24-44; column 6, lines 3-5

✓ US 5,990,605 A (YOSHIKAWA et al) 23 NOVEMBER 1999, see column 7, lines 32-54

Received / Aug

PATENT COOPERATION TREATY

From the INTERNATIONAL SEARCHING AUTHORITY

To: STEVEN P. FALLON
GREER, BURN & CRAIN, LTD
300 SOUTH WACKER DRIVE, SUITE 2500
CHICAGO, ILLINOIS 60606

PCT

NOTIFICATION OF TRANSMITTAL OF THE INTERNATIONAL SEARCH REPORT OR THE DECLARATION

(PCT Rule 44.1)

Applicant's or agent's file reference 120165872PCT	Date of Mailing (day/month/year) 06 DEC 2002
International application No. PCT/US01/43330	International filing date (day/month/year) 20 NOVEMBER 2001
Applicant THE BOARD OF TRUSTEES OF THE UNIVERSITY OF ILLINOIS	

1. ☒ The applicant is hereby notified that the international search report has been established and is transmitted herewith.
Filing of amendments and statement under Article 19:
 The applicant is entitled, if he so wishes, to amend the claims of the international application (see Rule 46):

When? The time limit for filing such amendments ~~is~~ normally two months from the date of transmittal of the international search report.
Where? Directly to the International Bureau of WIPO, 34 chemin des Colombettes
 1211 Geneva 20, Switzerland, Facsimile No.: (41-22) 740.14.35
For more detailed instructions, see the notes on the accompanying sheet.
2. ☐ The applicant is hereby notified that no international search report will be established and that the declaration under Article 17(2)(a) to that effect is transmitted herewith.
3. ☐ With regard to the protest against payment of (an) additional fee(s) under Rule 40.2, the applicant is notified that:

☐ the protest together with the decision thereon has been transmitted to the International Bureau together with the applicant's request to forward the texts of both the protest and the decision thereon to the designated Offices.
☐ no decision has been made yet on the protest; the applicant will be notified as soon as a decision is made.

4. **Reminders**

Shortly after 18 months from the priority date, the international application will be published by the International Bureau. If the applicant wishes to avoid or postpone publication, a notice of withdrawal of the international application, or of the priority claim, must reach the International Bureau as provided in rules 90bis.1 and 90bis.3, respectively, before the completion of the technical preparations for international publication.

Within 19 months from the priority date, but only in respect of some designated Offices, a demand for international preliminary examination must be filed if the applicant wishes to postpone the entry into the national phase until 30 months from the priority date (in some Offices even later); otherwise the applicant must, within 20 months from the priority date, perform the prescribed acts for entry into the national phase before those designated Offices.

In respect of other designated Offices, the time limit of 30 months (or later) will apply even if no demand is filed within 19 months.

See the Annex to Form PCT/IB/301 and, for details about the applicable time limits, Office by Office, see the *PCT Applicant's Guide*, Volume II, National Chapters and the WIPO Internet site.

Name and mailing address of the ISA/US Commissioner of Patents and Trademarks Box PCT Washington, D.C. 20231 Facsimile No. (703) 305-3230	Authorized officer LAN VINH Telephone No. (703) 305-6302
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PATENT COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 120165872PCT	<div style="display: flex; justify-content: space-between;"> <div style="text-align: center;">FOR FURTHER ACTION</div> <div style="font-size: small;">see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below.</div> </div>	
International application No. PCT/US01/43330	International filing date (<i>day/month/year</i>) 20 NOVEMBER 2001	(Earliest) Priority Date (<i>day/month/year</i>) 27 NOVEMBER 2000
Applicant THE BOARD OF TRUSTEES OF THE UNIVERSITY OF ILLINOIS		

This international search report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This international search report consists of a total of 2 sheets.

☒ It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

☐ the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing:

☐ contained in the international application in written form.

☐ filed together with the international application in computer readable form.

☐ furnished subsequently to this Authority in written form.

☐ furnished subsequently to this Authority in computer readable form.

☐ the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the

☐ the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

2. ☐ Certain claims were found unsearchable (See Box I).

3. ☐ Unity of invention is lacking (See Box II).

4. With regard to the **title**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,

☒ the text is approved as submitted by the applicant.

☐ the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No. _____

☐ as suggested by the applicant.

☐ because the applicant failed to suggest a figure.

☐ because this figure better characterizes the invention.

☐ None of the figures.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/US01/43330

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H01L 21/3063

US CL : 438/18, 459, 479, 486, 745, 750, 753

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : U.S. :US CL: 438/18, 459, 479, 486, 745, 750, 753

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,895,223 A (PENG et al) 20 APRIL 1999, col.4, lines 6-62.	1-23
Y	US 5,868,947 A (SAKAGUCHI et al) 09 FEBRUARY 1999, col.1, lines 36-38.	1, 12, 23
Y	US 5,695,557 A (YAMAGATA et al) 09 DECEMBER 1997, col. 16, lines 5-10.	8, 19
A	US 5,981,400 A (LO) 09 NOVEMBER 1999	1, 11, 12, 23

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

31 OCTOBER 2002

Date of mailing of the international search report

06 DEC 2002

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

LAN VINH

Telephone No. (703) 305-6302